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NOTE

Plant Protection Bulletin is intended to keep all Plant Protection workers in India informed of the progress of control work on plant pests and diseases in different parts of the country and of the advances and developments in Plant Protection work in other parts of the world. Suitable articles, reports, notes, observations and comments received from workers all over India will be published in the Bulletin. The notes from correspondents may also be in the form of suggestions, queries and opinions, even tentative, offered for discussion or consideration. The reports should in particular contain information on the sudden outbreak of diseases or pests or the equally sudden disappearance of other diseases or pests from a particular area. The progress made in spraying, dusting and other methods of disinfestation should form a prominent part of the reports. The intensity and severity of a disease or pest, or the absence of a pest or disease from a particular area and the prevalent conditions should be noted. If some varieties of a crop are not affected by a disease or pest, whereas others occurring in the vicinity have been attacked by them, then such information would be extremely useful. In reports containing control operations against pests and diseases, the cost of these operations and the savings obtained therefrom must be invariably stated. In accepting and publishing any material received from contributors, the Directorate of Plant Protection Quarantine and Storage serves merely as an informational clearing house. It does not assume responsibility of the subject-matter.

Any suggestions for the improvement of the Bulletin will be gratefully received.

HEM SINGH PRUTHI,
Plant Protection Adviser to the Government of India.

PLANT PROTECTION WORK IN MADRAS DURING 1948-50

by

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Intensive research, mostly on the usefulness of BHC and DDT for the protection of crops against their numerous insect enemies, has been in progress in Madras under the Government Entomologist from the year 1948 and the following is a gist of the work done and of the results obtained. The two insecticides are, at present, freely available in the form of dusts and wettable powders. The approximate quantity of the dust required for an acre is about 20 lb. The 5 per cent DDT dust costs about Re. 0.8-0 per lb. while that of 5 per cent BHC is being sold at Re. 0.4-0 per lb. As regards the sprays, about 100 gallons of fluid may be the optimum quantity for an acre and the approximate value of the chemical required to prepare a 0.1 per cent concentration of this quantity may be about Rs. 6 in the case of DDT and Rs. 26 in the case of BHC. The labour charges are not included. The field scale use of the chemicals is being popularised by a separate Plant Protection Organization and approximate figures of the areas covered under each pest, as extracted from the reports of the Plant Protection Officers, are being furnished to make the report complete by itself.

I. PESTS OF RICE

(a) **The rice grasshopper** (*Hieroglyphus banian* Fabricius).—This is one of the serious pests of rice in parts of Northern Circars and Malabar. The hoppers assume the most destructive phase when the crop is in shot-blade. They have the peculiar habit of gnawing at the neck of the flag-leaf and the injury often extends to the stalks of the ears. The flow of nutrition to the young ear is thus cut off, which in turn prevents its proper development and subsequent emergence. BHC D.025 was tried for the first time during 1948 in Krishna District. A very high death-rate of the adults and nymphs was recorded within the course of 3 to 4 hours after the treatment. The experiments were repeated next year to assess the comparative merits and optimum dosages of a number of the new synthetic chemicals and formulations like DDT and BHC dusts at different strengths, DDT emulsion, Toxaphene, E-605, etc., etc. The BHC compounds were found to have a specific action against the hoppers and the 5 per cent dust proved to be the most economical and efficient.

	Total area covered	Treatment
1948-49	8,000 acres	BHC D.025
1949-50	3,824.7 acres	BHC D.025

(b) **The Rice bug** (*Leptocoris acuta* Thunberg).—This is another destructive enemy of rice in parts of Coimbatore, Malabar, Salem, etc. The bugs appear in their hordes when the grains are in the milky stage, suck up the juice from the tender grains and render them chaffy. Experiments

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were conducted with DDT 3 per cent and BHC 2, 3, 4 and 5 per cent dusts. The latter even at the lower concentrations indicated a specific action. The bugs which came in contact with the chemical began to show obvious signs of distress and discomfort within about an hour. They first flew to a height of about 20 feet with a peculiar whirling movement and then fell dead in far off places. The dusted areas were completely free of these bugs in the course of 24 hours. The use of this chemical is being advocated as an approved method of control.

	Total area covered	Treatment
1948-49	119 acres	BHC D·025
1949-50	516 acres	BHC D·025

(c) **The Rice thrips** (*Thrips oryzae* Williams).—These are active tiny creatures usually found in large numbers inside the rolled up tips of tender leaves of the seedlings. They lacerate the plant tissue, suck up the sap and cause the withering of leaves. The comparative merits of DDT and BHC sprays at 0·25, 0·1 and 0·05 per cent concentrations and tobacco spray 1 in 6 were assessed during 1947-50. Both DDT and BHC were found highly effective at all the concentrations and even superior to tobacco spray.

(d) **The striped bug of rice** (*Tetradia histrioides* Fabricius).—This is a dark brown bug with a characteristic V shaped whitish mark on its dorsal surface. The adults and nymphs settle in large numbers on the plants and deplete them of their sap. The pest is sporadic to certain areas of Tiruchirappalli and Salem Districts. Various dusts like BHC 5 per cent and DDT 3 per cent Toxaphene 10 and 20 per cent and sprays of BHC and DDT at different strengths, Torch brand DDT 0·25 per cent, E-605 and DDT emulsion sprays were tried but only the BHC spray 0·1 per cent and the 10 per cent dust and Toxaphene were capable of exerting an appreciable control over the pest.

	Total area covered	Treatment
1948-49	17 acres	BHC D·025
1949-50	517 acres	BHC 10 per cent.

(e) **The Rice jassid** (*Nephotettix bipunctatus* Fabricius).—This is generally a minor pest but assumed serious proportions during 1946 in North Arcot and subsequently all over the entire Tamil Nad during 1948. It has since come to stay as one of the troublesome enemies of the rice crop in these districts. It is particularly serious on young crops grown under well-irrigation. Hand-netting and setting up of light traps were in vogue during the earlier days, but did not give any definite results. DDT and BHC both as dusts and sprays, were first tried at Coimbatore during 1948 but only the former was found to have a specific action, a complete mortality being effected in the course of three days. The spray was found to be cheaper. This synthetic product is being used enthusiastically at present by the ryots.

	Total area covered	Treatment
1948-49	284 acres	DDT 0·1 per cent spray
1949-50	1,743·5 acres	DDT 0·1 per cent spray.

(f) **The Swarming caterpillar of Paddy** (*Spodoptera mauritia* Boisduval).—These caterpillars, as the name indicates, often appear suddenly in swarms

mostly on paddy nurseries and graze away the entire foliage during nights, hiding under the clods and crevices during the day time. BHC D.025 was found to exterminate the caterpillars and the chemical has since come into popular use.

	Total area covered	Treatment
1948-49	6,299 acres	By flooding & dusting Gammexane.
1949-50	6,524 acres	BHC 5 per cent, DDT 5 per cent, 0.1 per cent spray.

(g) **Rats.**—A few species of these rodents occur in the field and one of these—*Gunomys kok* Gray—the mole rat is, by far, the most serious enemy of a variety of food crops like cereals, millets, fruits, vegetables, etc. The damage is being kept in check by mechanical method like digging out and catching, trapping, etc., augmented to a considerable extent by the use of Zinc phosphide as a poison bait.

	Total area covered	Treatment
1948-49	6,600 acres	Zinc phosphide in bait.
1949-50	19,167 acres	Zinc phosphide in bait.

II. PESTS OF MILLETS

(a) **The Sorghum ear bug** (*Calocoris angustatus* Lethierry).—This is a major pest of Sorghum which attacks the tender ears. The adults and nymphs cause an enormous drain on the cell-sap and ruin the grain formation. BHC has a quick knock down effect on the entire population. The standard dust formulation at 5 per cent applied at 20 to 30 lb. per acre is enough to control the pest, but later research has indicated that a 7 per cent dust when applied even at 15 lb. per acre is more economical and definitely more efficient.

	Total area covered	Treatment
1948-49	22.15 acres	BHC D.025
1949-50	263 acres	BHC 10 per cent dust and spray 1 oz. in 1 gallon of water.

(b) **The Deccan grasshopper** (*Colemania sphenarioides* Bolivar).—These hoppers occur in rhythmic cycles once in 7 or 8 years and each cycle may last for about 4 or 5 years. They cause considerable havoc to dry crops like *Setaria*, *Pennisetum*, *Sorghum*, Cotton, etc., in the Ceded districts. Bagging, ploughing up the soil, use of hopper dozers, etc., were some of the methods advocated during the earlier days, but all these were far from perfect. Trials

with BHC dust at 5, 7 and 10 per cent and DDT three per cent conducted during 1949 have definitely proved the possibility of controlling these hoppers with BHC dust 7 per cent to 10 per cent.

	Total area covered	Treatment
1948-49	..	..
1949-50	81.20 acres	BHC D.025.

(c) **The Ragi leaf caterpillar** (*Laphygma exigua* Hübner).—This caterpillar causes appreciable damage to Ragi nurseries in the Northern circars. It is also an occasional pest on tobacco, onions, chillies, lucerne, etc. DDT and BHC dusts at 5 per cent are capable of exterminating the caterpillars, the action of BHC being quicker.

	Total area covered	Treatment
1949-50	317.00	Arsenate and DDT Spray.

(d) **Thrips** on *Pennisetum* (*Anaphothrips ramakrishnai* Karny and *A. flourcinctus* Ramakrishna Margabandhu).—A bad attack of thrips on *Pennisetum* occurred at the Central Farm over an area of about 2 acres. The lethal effects of DDT and BHC 5 per cent dusts and tobacco spray were equally good. The reduction of population was noted much earlier in the BHC treated plots.

III. PESTS OF COTTON

(a) **The Cotton jassid** (*Empoasca devastans* Distant).—These are active tiny, wedge-shaped creatures which occur in their millions mostly on the exotic varieties of cotton. The attacked leaves present a crinkled appearance and with the increase in the infestation, the growth of the plants is retarded. The entire crop, if neglected often withers away. *Bhendi*, brinjal, potato, etc., are also susceptible to these jassids. Experiments were conducted with DDT 3.5 per cent, BHC 5 per cent dusts and sprays of DDT 0.1 per cent and BHC 0.05 per cent and HETP 0.1 per cent. DDT, both as dust and spray, had a spectacular action against these hoppers. The spray was found to be cheaper and more thorough. The recent commercial preparation HETP was equally efficient against these jassids as well as aphids.

	Total area covered	Treatment
1949-50	63 acres	DDT 5 per cent and 0.1 per cent spray.

IV. PESTS OF OIL SEEDS

(a) **The Red hairy caterpillar** (*Amsacta albistriga* Walker).—The caterpillars are a regular scourge of the dry crops in most of the dry red soil tracts of this State and the time honoured method of control is the systematic hand-picking of the different stages. Trials with DDT and BHC dusts at 3, 4 and 5 per cent. sprays at 0.1 and 0.05 per cent and DDT emulsion sprays at 0.16, 0.32 and 0.48 and 0.64 per cent concentrations were conducted

during 1949. BHC sprays at 0.05 and 0.1 per cent caused a fairly high mortality of the grown-up caterpillars while the dust at 5 per cent was effected in killing the young caterpillars, trapped in trenches. DDT kerosene emulsion was also effective but has the disadvantage of causing a phytocidal action, when used at stronger doses. More recent trials have shown that the grown up caterpillars also succumb to BHC 10 per cent and Agrocide cotton dust.

(b) **The Castor semilooper** (*Achaea janata* Linnaeus).—This is one of the major pests of the crop often appearing in its millions and entirely defoliating the crop within an incredibly short time. A variety of insecticides like BHC 5 and 10 per cent, DDT 5 per cent dusts, Pyrodust, G-205P, Agrocide cotton dust, BHC spray 0.1 and 0.05 per cent, DDT spray 0.1 per cent and 0.05 per cent, Calcium arsenate, Thevetia and Pyrocolloid sprays were tried, but none of these offer any real promise of control. BHC dusts effected a fair percentage of mortality against the young caterpillars while the spray at 0.1 per cent gave but in different results against the full grown ones. From what has been observed so far, an effective insecticidal warfare does not appear to be feasible in this case. The more reliable remedy is the hand picking and destruction of the caterpillars.

	Total area covered	Treatment
1949-50	10.5 acres	Calcium arsenate spray.

V. PESTS OF FRUITS AND VEGETABLES

(a) **The Orange borer**: (*Cheledonium cinctum* Guerin-Meneville).—This Cerambycid which was till recently rampant in parts of Mysore, Coorg, has now developed as a major pest of Mandarin oranges at Wynad. Sprays with DDT and BHC, though they reduced the infestation, the cost of their application was not commensurate with the results. Clipping of the wilted twigs at the critical stage appears to be almost infallible, with the added advantage of being extremely cheap and simple. The method is being enthusiastically followed by the local planters, the approximate cost of treating an acre, being about Rs. 4.

	Total area covered.	Treatment
1948-50	40,000 trees	Clipping wilted twigs.

(b) **The mango hopper** (*Idiocerus* spp.).—Three species of this jassid (*Idiocerus* spp.) occur freely almost all over the mango areas, but the medium sized one *I. nevosparus* Lethierry is more serious in most parts of South India. These bugs breed in their millions on the flowers and flower stalks and blight the entire inflorescence by sucking up the juice from the tender portions. DDT both as dust at 5 per cent and spray at 0.05 per cent had a salutary effect against this jassid also, the time honoured method of spraying with Fish oil rosin soap being effective only against the nymphs and that too when applied at frequent intervals.

1948-49	2,000 trees.	By various treatments.
1949-50	5,020 trees.	DDT 1 lb. in 30 gallons of water.

(c) **The mango shoot webber** (*Orthaga exynacea* Hampson).—This slender pale green caterpillar is often found webbing the terminal leaves together. Apart from devouring the leaves, they also prevent the normal emergence of

the flowers. BHC sprays at 0.1 and 0.05 per cent have a high lethal action against these caterpillars.

(d) **The Ber fruit borers** (*Carpomyia vesuviana* Costa and *Meridarches scyroides* Meyrick).—Of these two, the former takes a heavier toll of the fruits, partly by causing the fruit shedding and a good deal more by boring into the fruits and ruining the edible material. BHC spray at 0.2, 0.1 and 0.05 per cent and DDT 0.2 per cent and 0.1 per cent as well as DDT emulsion at 0.08 and 0.16 per cent were given a fair trial at Panyam. The gist of the findings is that all these formulations reduce the infestation to an appreciable degree. The figures of the combined infestation by these pests were about 17.0 per cent and 35.0 per cent in the case of BHC 0.05 per cent and DDT 0.1 per cent as against 82 per cent in the control. Four rounds of spray commencing from the setting of the fruits till about a month prior to harvest, were given at intervals of 21 days. The cost worked out to Rs. 1/3/- and -/13/- and an additional yield of 68 lb. and 70 lb. per tree was recorded for BHC and DDT respectively. The money value of the respective extra yield after deducting the above charges comes to Rs. 10/3/- and Rs. 10/13/-. It is proposed to recommend DDT, as it is cheaper and does not leave any taint of its smell on the fruits.

(e) **Cockchafer beetle grubs** (*Melolonthidae*).—These are stout, pale white grubs with a curved body and feed on the roots of plants. The damage is often very serious on the Hills on peas, strawberry, etc. BHC 5 per cent dust applied round the plants at a depth of a few inches below the soil level kills all the grubs which come in contact.

VI. PESTS OF NARCOTICS AND DYES

(a) **The Agathi weevil** (*Alcides bubo* Fabricius).—The adults have the habit of nibbling the leaves of Agathi, the common standard for betel vine but, by far, the greater damage is caused by the grubs which feed inside the plant tissue. Their activities are characterised by the prominent swellings. BHC 5 per cent DDT 3 and 5 per cent dusts and spray at 0.1 and 0.05 per cent were tried on a number of occasions and both of them were found capable of exterminating the weevil, but the action of BHC spray was quicker.

(b) **The betel vine bug** (*Disphinctus politus* Walker).—This is a slender active reddish brown bug which punctures the tender leaves for the sake of the juice. The attacked leaves show the characteristic blisters and often wither away. DDT and BHC dusts and sprays at the common concentrations are capable of wiping away these troublesome insects.

	Total area covered	Treatment
1948-49	20 acres.	..
1949-50	2 acres	DDT spray.

VII. PESTS OF VEGETABLES

(a) **The Brinjal Epilachna** (*Epilachna vigintioctopunctata* and *E. dodecastigma* Mulsant).—The adults and grubs scrape and feed on the green matter of the leaves. The comparative merits of BHC and DDT at 3, 4 and 5 per cent and sprays at 0.05 per cent and 0.1 per cent, 0.025

per cent and Calcium arsenate dust 1 in 6 were studied. DDT exerts an appreciable control, equal to that of Calcium arsenate, but its application invariably brings about a severe incidence of mites. The synthetic chemicals do not, therefore, offer much scope of displacing the existing one in this case.

	Total area covered	Treatment
1948-49	262 acres	Calcium arsenate dusting.
1949-50	934 acres	Calcium arsenate dust and spray.

(b) **The Chillies thrips** (*Scirtothrips dorsalis* Hood).—These minute insects, yellow in colour and with fringed wings occur in large numbers on tender shoots and flowers and lacerate the tissues to feed on the sap. The leaves get curled up and the plants themselves are stunted in growth. Experiments with 3, 4 and 5 per cent dusts and sprays of 0.1 and 0.05 per cent of BHC and DDT, tobacco, etc., show that the synthetic chemicals, especially BHC in both the forms are quite effective and even better than tobacco. The application of the chemical is, therefore, being recommended as a definite remedy.

	Total area covered	Treatment
1948-49	85 acres	Tobacco spray.
1949-50	7,370 acres	BHC 5 per cent and BHC spray.

(c) **The Onions and garlic thrips** (*Thrips tabaci* Lindeman).—These minute insects infest the onion and garlic crops and cause almost a wholesale ruin year after year. The loss is so heavy that the ryots often hesitate even to cultivate these highly remunerative crops. Among the various forms and concentrations of DDT and BHC tried, the latter at 0.05 per cent to 0.1 per cent produced such spectacular effects, that the money value of the crop saved is estimated to be about Rs. 1,000 per acre while the cost of the spray was only from Rs. 10 to Rs. 20.

	Total area covered	Treatment
1948-49	8 acres.	BHC 0.1 per cent spray.
1949-50	451.45 acres	BHC dust and spray.

(d) **The lab-lab bug** (*Coptosoma cribraria* Fabricius).—These hemispherical insects are commonly found in colonies on lab-lab, agathi, etc., emitting an undesirable smell. Five per cent dusts and 0.1 sprays of DDT and BHC practically exterminated these insects.

Before concluding the account of the field research on the adaptability of BHC and DDT, a gist of the findings along with certain precautions to be observed in their use may not be out of place here.

While it cannot be denied that the recent advent and availability of the two synthetic chemicals, have been a real blessing, especially in these days of food scarcity, it has also to be mentioned that a certain amount of judgment and caution is indispensable in their use, since any inadvertant use, may apart from not producing the desired results, be fraught even with phytocidal risks. The general adaptability of BHC either as dust or spray against a wide range of insects and the selective action of DDT against certain specific groups like jassids are points of primary importance. Again the comparatively feeble action of DDT against pests like mites, aphids, etc., and its higher lethal effects against their parasites and predators are factors which often encourage an inordinate infestation by these two pests on crops treated with this insecticide.

The possible phytocidal risk attendant on the use of these chemicals is a more serious aspect to be borne in mind. Certain species of cucurbits are highly sensitive even to the first application of BHC, while a few other plants which are not apparently affected by the first dose, exhibit obvious symptoms of the adverse effects after a few more sprays. DDT, on the other hand, appears to exert even a stimulative action. The residual action of these chemicals and the possible reaction on cattle and human beings consuming edible material like vegetables, fruits, etc., treated with the chemicals are still unexplored fields in this part of the country. Investigations on the latter aspects are in progress.

HINTS ON SPRAYING FRUIT TREES *

The following advice is given to enable pest control operators to get the best out of their equipment and materials.

1. Use adequate equipment so that the property can be covered within five to six days. This is necessary when timing spraying according to a particular stage of bud development or period of maximum insect activity.

2. High pressure (300-400 lb. per square inch) are more efficient and cover the trees more rapidly, so keep the spray pump in good condition.

3. Do not spray in showery weather. Sprays which dry slowly may damage the tree. This applies particularly to lime sulphur sprays. If a shower follows a spray application much of the spray material will be washed off the tree.

4. Do not spray in a high wind. Under those conditions it is not possible to cover the tree properly and much spray material will be wasted.

5. Do not spray in very hot weather. Spray damage at such time is likely to be severe with certain materials, such as lime sulphur. Cover each limb systematically from bottom to top. The missed tip of a leader may be the source of infestation for the rest of the tree.

6. Before commencing to spray, make sure the vat is clean and uncontaminated from previous spray mixtures. This applies especially to previous sprays containing arsenic or hormone weed killers.

7. To simplify spraying, prune trees systematically to eliminate criss-crossing limbs.

Watch the spray mixture : Most sprays are more efficient when applied singly. Now-a-days, however, labour shortage and rising costs require growers to use combination sprays wherever possible. The following spray materials are listed together with advice on other materials which may or may not be used in combination.

Lead arsenate : Do not mix lead arsenate with soap solution, borax or zinc sulphate alone. It may be mixed with white oil emulsion and Bordeaux mixture. When used on peaches or almonds, lead arsenate may be mixed with equal quantities of slake lime and zinc sulphate. When mixing with lime sulphur add lead arsenate to dilute lime sulphur to which has been added one half pound of lime casein or 2 lb. of slaked lime. Spray out immediately. Lead arsenate may be mixed with nicotine sulphate or colloidal sulphur, but do not mix with HETP.

DDT : Emulsion should not be mixed with lime sulphur or other alkaline sprays which hasten decomposition. Despersible powders may be mixed with lime sulphur or Bordeaux. All forms may be mixed with lead arsenate or preharvest sprays for prevention of fruit drop. Do not mix with white oil for summer sprays or with HETP.

White Oil : White oil may be mixed with lead arsenate, Bordeaux zinc-lime spray, nicotine sulphate. Do not mix white oil with lime sulphur or any other sulphur sprays or apply sooner than three weeks following a sulphur spray.

*Extract from "Control fungous diseases in the Spring" by G.W. Gayford, 1950. J. Dep. Agric. Victoria, Australia, 48 (8) : 367-369.

Pale Oil (Semi-Dormant Oils).—Use pale oil only in winter or early bud burst stage. It may be used in combination with lime sulphur, Bordeaux, or nicotine sulphate.

Red Oil (Dormant Oil) : Use red oil on trees only in dormant stage and do not combine it with lime sulphur or Bordeaux. Red oil may be combined with nicotine sulphate.

DNC Sprays : This spray should not be combined with Bordeaux.

Tar distillate : A combination of tar distillate with Bordeaux is frequently used, but the mixture may cause damage to peach buds.

Nicotine sulphate : Nicotine sulphate may be combined with most other sprays. Usually applied in combination with white oil or soft soap which are activators.

E 605 : This may be combined with most other sprays. Alkaline substance such as lime sulphur, slaked lime or Bordeaux mixture, will hasten decomposition.

HETP : Use HETP only with a spreader or a wetting agent recommended by the manufacturers. Do not mix with lead arsenate in DDT or white oil.

Lime Sulphur : See notes under lead arsenate, DDT and oil sprays.

Bordeaux mixture : Bordeaux mixture may be used with lead arsenate, white oil emulsion, nicotine sulphate, dispersible powder forms of DDT but not with DNC winter sprays. Do not fumigate citrus trees sooner than twelve months following a Bordeaux spray.

Preharvest 'Anti-drop' sprays : These sprays may be mixed with lead arsenate, DDT and oil sprays.

Zinc sulphate—Zinc sulphate dissolved in water is used as a spray during the winter to cure zinc deficiency in deciduous fruit trees. It should not be applied in combination with oil sprays because it may break the emulsion. The combination zinc-sulphate slaked lime may be combined with oil emulsion or Bordeaux mixture for application to citrus trees.

Zinc Oxide : Zinc oxide may be combined with oil emulsion or Bordeaux mixture.

Use spray materials with care—a warning : Most chemicals used in fruit sprays are poisonous to humans and animals as well as the insects or fungi against which they are directed. Spray operators should be made fully aware of the dangers which exist in careless handling of these materials.

Some of the newer organic insecticides may be absorbed into the system through the skin and these should not be allowed to come into contact with bare hands. Included in this category are DNC., DDT., HETP., and E 605.

HETP and E 605 or parathion are organic phosphorus compounds which are particularly toxic to humans and every care should be taken by spray operators to avoid inhaling spray drift. In transferring these materials from the container to the spray vat, gloves should be used.

Tar distillate has a burning effect on exposed skin. This may be countered by applying lanoline or castor oil to the face or hands before spraying.

Operator should not smoke or roll cigarettes while spraying. Smoking may increase possible ill effects of E 605 or nicotine sulphate.

The hands and face should be thoroughly washed before a meal is taken.

CONTROL OF BLISTER BLIGHT BY COPPER FUNGICIDES

By Peter De Jong

Chief Scientific Officer

United Planters Association of Southern India, Coonoor, Nilgiris

The last year has seen considerable progress in control of Blister Blight of Tea (*Exobasidium vexans*). Copper fungicides have long been known to be effective against this disease, but only recently has the technique of applying fungicides to tea in plucking been investigated.

The approval by the U.K. authorities of a 150 p.p.m. tolerance limit for copper residues in manufactured tea, cleared the way for work on protecting tea in plucking against Blister Blight using copper fungicides.

Investigations this year by the Tea Scientific Department of the United Planters Association of Southern India, showed that copper dusts with varying percentages of metallic copper and at varying rates of application could be safely used on tea without interfering with the quality of the manufactured tea or creating a toxic hazard and afforded a good measure of protection against the disease.

Concurrently, in Ceylon representatives of Messrs. Universal Crop Protection Ltd., assisted by the staff of the Tea Research Institute of Ceylon were carrying out a series of field trials with power dusting machinery and "Cuprosana" dust fungicides. Dusting was carried out throughout the S.W. monsoon and it was demonstrated that good control of the disease was possible using a 2 per cent Cu. dust at rates of about $7\frac{1}{2}$ - 10 lb. per acre. Even under extreme monsoon conditions dusting was possible and leaf coverage and adherence was very satisfactory. In order to avoid creating a toxic hazard, rounds of dusting were timed to follow the rounds of harvesting the leaf (plucking), so that the maximum possible time (7-10 days) elapsed before treated leaf was harvested. The number of rounds of dusting is dependent upon the length of the rainy season and its intensity. The disease makes its appearance with the pre-monsoon showers and may fall off in intensity at the peak of the monsoon, building up again later. In some areas upward of 20 rounds of dusting may be necessary to protect tea in plucking.

In tea recovering from pruning, where there is a very high proportion of susceptible tissue, it was found that regular applications of a 6 per cent Cu. dust afforded adequate protection.

It must be emphasised that the importance of these findings are more concerned with the technique of APPLICATION than with the MATERIAL.

In a plantation crop such as tea, where due to terrain and other factors it is extremely difficult and often impossible to use standard methods of fungicidal etc., application, the problem of efficient and economic application is often greater than that of material.

By power dusting, areas up to 40 acres per hour can be effectively treated greatly simplifying the whole process of crop protection.

The Cuprosana range of dusts have been specifically designed for this purpose and it is anticipated that this monsoon season will conclusively demonstrate the efficiency and practicability of this method of control of Blister Blight in tea.

WHEAT RUST SITUATION IN INDIA IN 1950-51

PUNJAB (1)*

All the three forms of rust namely, yellow, brown and black are prevalent in this State and these singly or collectively, take a heavy toll of the wheat yields almost every year. Of these three, yellow rust, as a rule, is the first to make its appearance on the wheat plant followed by brown and thereafter late in the season, by stem (black) rust. Yellow rust attacks wheat in greater or lesser severity almost every year, while brown and black rusts appear periodically.

As is well known, the appearance of these three fungal diseases is mainly dependent upon the presence of atmospheric humidity during the growing season of wheat. Practically whole of the rabi season 1950-51 was marked by lack of cloudiness and absence of rains continuously from the sowing time of the wheat crop (*viz.*, October and November) to the third week of March. (These climatic conditions did not favour the spread of any of these rusts and accordingly none of them appeared in any epidemic form during whole of this crop season. However, mild attack of yellow rust was noticed in Gurdaspur submountainous and abnormally humid district) towards the middle of January and was not observed anywhere else. Brown rust made its appearance towards the close of February mainly on some of the exotic wheats at Jullundur but it did not assume any serious proportion. Stem rust also failed to appear this year except at a late stage in the beginning of April. The attack of this rust was noticed in such portions of wheat crop as had lodged due to heavy rainfall from 24-3-1951 to 26-3-1951 accompanied by strong gales of wind. On the whole the incidence of this rust also was quite nominal and it is expected that the wheat crop in Punjab will give fairly good yields.

WEST BENGAL

By S. B. Chattopadhyay†

Wheat is cultivated to a limited extent in West Bengal, the total area under the crop being approximately one lac acres; 75-80 per cent of this lies in the districts of Murshidabad and Malda, the rest being scattered throughout West Bengal, particularly in districts of Nadia, Birbhum and Bankura. The area is almost exclusively under certain local varieties, namely "Puti", "Kheri", "Jamali", "Gangajali", etc. Wheat is sown between mid October to mid November and is harvested in March. Brown leaf rust (*Puccinia triticina* Erik.) appears almost annually in a very serious form, causing extensive damage particularly to the late varieties. The disease usually appears from late January to early February. In the Himalayan hills (Darjeeling district) wheat is cultivated in the rabi season on a very small scale; nevertheless, both *Puccinia graminis tritici* Erik. and Henn. and *Puccinia triticina* are present.

In 1950-51 sowing of wheat was delayed till early December in the plains due to frequent rains from mid October to mid November. During the period of growth, the day temperature was comparatively high (maximum temperature being 85°-90°F.) and night temperature low (55-60°F.). There were no rains during the period but there was copious dew and long spells of wet foggy weather in the early hours of the morning.

*From Economic Botanist, Cereals, Cotton and Oilseeds, Jullundur.

†State Agricultural Research Institute, West Bengal, Calcutta.

In the season in question, *Puccinia triticina* appeared preponderantly *Puccinia graminis tritici* was observed in a comparatively small number of cases and was mainly noticed on different N.P. varieties under trial and certain varieties grown from seeds brought from PEPSU. *Puccinia triticina* was noticed on wheat crop from mid January onwards. The attack appeared to be very mild in the initial stages, and the spread of the disease was slow. But from early part of February onwards, after the inflorescence had emerged, the disease spread rapidly and became rather severe. It is presumed that the prevalence of foggy period in the early hours of the morning and copious deposition of dew coupled with high temperature during the day helped the rapid spread of the disease.

Black stem rust (*Puccinia graminis tritici*) was observed in fields 15-20 days later, and became severe on the stem and leaf sheaths over a large area.

Considering the State, as a whole, the rust disease throughout the plains, was moderately severe. As stated previously *Puccinia triticina* was extensively observed. It appeared early in the season and continued throughout the growing period. Excepting the local variety "Gangajali", which developed infection type 2, and was comparatively resistant, all other varieties including N.Ps. produced infection types 3 and 4. *Puccinia graminis* was also fairly severe in those cases where it produced infection types 3 and 4. Favourable weather conditions for the spread of the disease in the later phase of growth, after the inflorescence had emerged, were apparently responsible for the severity of the disease.

Though the disease appeared in virulent form rather late the effect on the reduction of yield was significant. On the whole 10-15 per cent of the total yield was lost due to the disease. The effect was particularly pronounced on late varieties where the inflorescence was considerably dwarfed and a large number of grains shrivelled.

In the hills, the rust was rather mild, *Puccinia triticina* was almost exclusively present and it was more severe on the local varieties than on N.Ps. In previous years, *Puccinia graminis tritici* was noticed to be more widely occurring and more destructive in nature, but this year, it was practically absent.

Two interesting observations were made. Telia of *Puccinia triticina* were noticed on the leaves in many cases towards the later part of the season. Secondly in those varieties or plants where rust was not severe, the attack of *Helminthosporium sativum* Pamm. King & Bakke was observed in a more virulent form.

PEANUTS-ESPECIALLY THEIR DISEASES*

The diseases of peanuts are virus, bacterial and fungal.

Virus diseases: *Peanut rosette* also known as "Arachis virus", "groundnut curl disease," "clump disease" and "groundnut leaf rosette" occurs in South Africa, U. S. A., Java, Madagascar and India. A similar disease has also been reported from Brazil, Australia, Russia and Argentina.

The symptoms of the disease are a stunting of the plants, chlorosis or mottling and malformation of the leaves. All or a few of the symptoms may be present.

The disease can be transmitted by grafting and by the insect vector *Aphis medicaginis*. The presence of weeds inhibits rosette. Accordingly, delayed and selective weeding, interplanting with cereals, fallowing and rogueing of the first diseased plants are recommended as control measures.

Necrotic spot: This disease is of an unknown nature, although according to Weiss, it is probably due to virus. The symptoms appear on the lower leaf surface as deep brown or almost black splotches. Most of the plants become chlorotic or pale green, stunted and poorly nodulated and produce low yields.

Ring spot: It is reported from Brazil and is characterized by yellow circular lesions, bearing necrotic flecks in young leaves, crinkling, upward rolling, chlorotic mottling, ring and line patterns in subsequent leaves, necrotic spots or streaks in stems and arrested growth.

Stunt: This is characterized by vein clearing, severe stunting and a rosette appearance. The disease has been reported from Texas (America) and is due to a virus.

Pale dwarf: This disease has been reported from Java and is believed to be of non-parasitic origin. The leaflets and the petioles get shortened and thinner and turn pale. There is however no curling and crinkling of leaves.

Bacterial diseases: *Bacterial wilt*, has been reported from America and is caused by *Bacterium solanacearum*. The diseased plants turn yellow and later on wilt. Wilting is characterized by the development of dark brown spots in the xylem and the pith.

Infection is through an insect wound or through lenticels.

The disease is favoured by high temperatures. Certain weeds are also affected by the disease. No satisfactory control measures are yet known.

Fungus diseases:

Sclerotium wilt: *Sclerotium wilt*, caused by *Sclerotium rolfsii* is widespread and destructive. It is characterized by the development of a mass of white mycelia on the stem below the surface, studded with spherical or ellipsoid whitish or brownish sclerotia. Ultimately the infected plants collapse. Different varieties of peanuts show varying degrees of resistance against the disease. The disease is soil borne and can be controlled by the use of resistant varieties, and by crop rotation. Besides, eradication of diseased plants, burning of crop residue, wide spacing of plants and the application of lime are other recommended measures.

*Extract from "Peanuts—Especially their Diseases" by Harold D. Loden; 1950, Economic Botany, 4, (4); 354-379.

Leaf spot : The leaf spot disease is one of the most important diseases of peanuts and is caused by either *Cercospora personata* or *Cercospora arachidicola*, or both. The disease occurs in all the peanut-growing regions of the world, and is characterized by the development of brownish spots on leaves and stems. In case of *C. arachidicola* these spots have a yellowish border, but the same is absent in *C. personata*. There are also differences in spore measurements. The spores are disseminated by wind or insects and can survive in the soil on plant refuse. Different varieties of peanuts exhibit varying degrees of resistance. The resistance to the disease caused by *C. personata* and *C. arachidicola* is inherited independently.

The disease can be controlled by the use of resistant varieties. Besides dusting the crop with sulphur or the application of Bordeaux mixture is also recommended.

Fusarium wilt : This is caused by *Fusarium martii*, var. *phaseoli* and is characterized by yellowing of the leaves and wilting of the plant. The fungus produces most serious damage to young plants during dry weather. The use of disease free seed and rotation of crops are suggested as possible means of control.

Concealed damage : This is a type of seed decay that begins on the inside of the seed and is not visible until the seed is broken. Damaged seeds have rancid taste. The disease appears on land that is cropped to peanuts continually. The exact nature of the disease is not known, although the tendency is to attribute it to certain fungi that have been isolated viz., *Diplodia theobromae*, *Rhizoctonia* sp., *Sclerotium bataticola*, *Penicillium* spp., etc. especially the former.

Windrowing of peanuts has been suggested as a means of reducing the damage. In U. S. A. the Dixie Runner variety has been found to be less susceptible to concealed damage than other varieties.

Blue black discolouration : In the U. S. A. the Spanish type of peanuts are normally affected with this disease. A blue or blackish discolouration is noticed on the seed coat, the cotyledons may or may not be discoloured. The shell also may be discoloured or damaged. *Sclerotium rolfsii* is invariably found associated with this disease and it appears that the discolouration appears as a result of the saprophytic growth of the fungus over peanuts during curing. To prevent this discolouration it is recommended that the peanuts be speedily dried up while curing.

Diseases of minor importance

Besides the diseases mentioned above, a few minor diseases are also known. These are :

1. Rust diseases, caused by *Puccinia arachidis* and *Uromyces arachidis*
2. Dry rot caused by *Macrophomina phaseoli* (*Sclerotium bataticola*).

Other fungi causing minor diseases are *Diplodia natalensis*, *Phyllosticta* spp., *Parodiella* spp., and *Sphaceloma arachidis*.

Seed treatment with organic sulphur or mercury compounds, before sowing ensures a good stand and is recommended.

RECORDS OF DISEASE OCCURRENCE

Important Plant Diseases In Madhya Bharat in 1951.

By B.G. Nikam*

WHEAT :

1. *Loose Smut*.—Loose smut of wheat usually appears in February and does considerable damage. This year a loss of 5—10 per cent has been estimated. Local drum wheat (Malvi) is more susceptible than the local vulgare. In certain cases, the loss may be up to 25 per cent. "Solar-energy" treatment, when the day temperature goes above 110°F., is recommended to the cultivators.

2. *Root-rot*.—This disease occurs at a critical time when the crop is approaching maturity. Patches of dead and dried plants are observed in the fields. It causes about 10 per cent loss to the crop.

3. *Seedling blight*.—(*Fusarium* sp.) The disease appears in a severe form when the plants are in the seedling stage and is characterized by a sudden wilting and browning of succulent stems. In advanced stage the fungus grows even on the surface of the soil. Losses may vary from 25—50 per cent.

GRAM :

Wilt.—This disease is very common all over Madhya Bharat and losses from 10—20 per cent have been recorded. In most cases *Rhizoctonia* sp. and in a few, *Fusarium* sp. have been isolated from diseased plants.

LINSEED :

Wilt.—(*Fusarium lini*). This disease is very serious in certain places of Malwa and has become a limiting factor in the cultivation of linseed, which is an important crop in Madhya Bharat. The problem of finding resistant varieties has been taken in hand.

BETEL-VINE :

This is the most important garden crop which fetches 30—40 lakhs of rupees every year to Pan-growers. Average loss due to various diseases has been estimated from 8—10 lakhs of rupees. In many Pan-growing villages, the outbreak of the diseases has completely destroyed the crop. The Pan industry of Bhilsa and Badnagar (Dist. Ujjain) has been completely wiped out. Species of *Fusarium*, *Rhizoctonia*, *Sclerotium*, *Colletotrichum*, *Gloeosporium* and *Oidium* were recorded on diseased vines.

SWEET-POTATO :

On account of the present food situation in the country, the cultivators of this part are increasing the area under this crop. A severe leaf spot disease due to *Alternaria* sp. has been recorded and the problem is being tackled in this laboratory.

BRINJAL :

Wilt.—The disease is characterized by sudden wilting of the plants at the time of maturity. During the last winter season the crop was severely affected by complete or partial wilt and several fields were completely destroyed. From a number of diseased roots, *Fusarium* sp. was isolated.

*Plant Pathologist, Agricultural Research Laboratory, Gwalior.

Important Diseases of Crops in Bihar known and new in 1950-51

By J. N. Mishra*

1. *Dakhina Disease of Paddy*.—This is a well-known disease in Bihar and occurs generally in patches throughout the State. It is supposed to be due to the deficiency of sulphate ions in the soil. The general symptoms are yellowing and stunting of the plants in patches after transplanting, and consequent failure of flowering and fruiting of the affected plants.

Crude Sodium sulphate (Khari Namak) which has been used for a long time at the rate of 30 lb. to 40 lb. per acre, and which was found by Saran to give the best results, when broadcast on the affected patches, induces the diseased plants to recover and grow quickly to their normal height.

2. "*Die-Back*" of *Chillies* (*Colletotrichum capsici* (Syd.) Butler and Bisby).— This disease, which has been described by Butler, is the most severe disease of chillies in North Bihar where that crop is intensively cultivated and is characterized by progressive dying which starts from the flowers and may travel right down to the ground level in damp weather during September and October. Copper fungicides have been very successfully employed to check the disease and to stop the infection of the healthy plants. Due possibly to excessive drought during 1950, the disease was not very severe.

3. *Maize Wilt*.—Of late Wilt, a hitherto unknown disease of maize has been found to seriously affect maize in North Bihar, especially in the North West portion of the State. Though wilting may take place at any stage of growth, the disease becomes serious at the time of cob formation.

The leaves lose the green colour in small circular to oblong patches, they become whitish with slightly reddish tinge and the plant dies almost quickly. From 15 to 60 per cent of the plants may die and cultivators are sometimes forced to grow some other kharif crop.

A *Fusarium* has been isolated from the dead pith. Further studies are in progress.

Exposure of the soil to the summer heat by immediately ploughing up the land after the rabi harvest and rotation with other Kharif crops are at present recommended.

4. *Covered Smut of Barley* (*Ustilago hordei* (Pers.) Lagerheim).—After rusts this is the most widely occurring disease of the Rabi cereals throughout Bihar. Three to five per cent of the plants are generally affected but in severe cases up to 10 per cent of the ears are found to be smutted.

Seed treatment with Organic mercury compounds is recommended.

5. *Loose Smut of Wheat* (*Ustilago tritici* (Pers.) Rostrup).—This disease is very scarcely found in Bihar and no control measure has been necessary.

6. *Yellow Vein Mosaic in Bhindi*.—This is the most serious Virus disease of bhindi in the State. Yellowing of leaves is noticed right from the beginning when the plants have 3 to 4 leaves, and progresses rapidly to other plants. In intensively cultivated areas not a single plant is found to be green. The plants may often grow taller than normal but the fruits are very few in number and smaller in size than on healthy plants.

*Mycologist to the Government of Bihar P.O. Sabour, Dist. Bhagalpur.

No measure has yet been taken to control the disease.

7. *Mosaic and Leaf curl of Papaya*—These are the most serious Virus diseases of Papaya, and at places like Sabour where Papaya had at one time been growing very well, it has now become scarce.

No measure has yet been taken to control these diseases.

8. *Late Blight of Potato* [*Phytophthora infestans* (Mont.) de Bary].—Due to abnormally dry weather the disease was much restricted last season and most of the potato-growing tracts remained practically free from disease. However in the low lying tract of the Patna City the disease affected the yield of the crop seriously.

A block of about 100 acres sprayed three times with a copper fungicide by the Central Government in collaboration with the State Government, remained free from the disease.

9. *Colocasia Blight* (*Phytophthora colocasiae* Rac).—This disease is very commonly found everywhere in Bihar on cultivated and wild colocasia during the rains. The entire foliage is often killed. Spraying with a copper fungicide along with rosin and soda as sticking and spreading materials respectively has been found quite successful in controlling the disease.

10. *Brown leaf spot of paddy* (*Helminthosporium oryzae* Brede de Haan). This disease occurs extensively throughout the State and is severe in the cooler hilly tracts of South Bihar.

Seed treatment with organic mercury compounds or spraying Bordeaux Mixture on the affected field has been found to give only limited protection.

11. *Wilt of Arhar* (*Fusarium udum* Butler).—This is another very extensively found disease throughout the State. In North Bihar, the disease is often very serious and kills up to 25 per cent of the plants. In South Bihar where the crop is not grown extensively, the disease is less frequently observed.

Testing of the different varieties of arhar of the Economic Botanist, Bihar for resistance to the disease is in progress.

12. *Powdery Mildew of Peas* (*Erysiphe polygoni* D.C.).—This disease is quite common in Bihar and causes much loss to the crop. Spraying the crop three times with a copper fungicide increased the yield by about 30 per cent.

13. *Rust of Linseed* (*Melampsora lini* (Pers.) Lev.).—This is the most important disease of linseed in Bihar. Last season the intensity of attack of this disease was almost negligible, probably due to extreme drought conditions.

14. *Leaf spot of Turmeric* (*Taphrina maculans* Butler).—This disease is quite serious in North Bihar and in parts of the South and spoils a considerable amount of the foliage. No measure has yet been taken to control the disease.

Citrus Canker in Assam

By S. Chowdhury*

Canker caused by *Phytophthora citri* (Hesse) S.A.B. is one of the most serious diseases of citrus in Assam. It occurs in all the citrus growing tracts of the State, and causes heavy damage. The disease usually appears in a virulent form during the rains, continuing from May to August; during the rest of the year it is practically absent.

* Mycologist to the Government of Assam, Jorhat.

Survey and observations so far made have shown that all the species and varieties of citrus grown in Assam are not equally susceptible to this disease. Washington Navel (*Citrus sinensis* Osbeck), grape fruits (*C. paradisi* Macf.), Ada Jamir (*C. assamensis* Dutt and Bhattacharjee), lime (*C. aurantifolia* Swingle), particularly the oval types have been found highly susceptible. Valencia (*C. sinensis* Osbeck Valencia) Khasi orange (*C. reticulata* Blanco) and Robab Tenga (*C. grandis* Osbeck) are rarely attacked while Soh-Myndong (*C. jambhiri* Lush-*C. limonia* Osbeck), Kata Jamir or Tulia Tenga (*C. jambhiri* Lush), Kata Jamir and Karun Jamir (*C. aurantium* Linn.) are not attacked.

Spraying trials so far carried out with Perenox and Bordeaux Mixture have shown that this disease can be successfully kept under control by spraying the plants with either of these fungicides. Perenox was used at the rate of 3 lb in 100 gallons of water and Bordeaux Mixture in the proportion of 2:2:50. The first spraying was given by the middle of April and the subsequent spraying at an interval of 15 days or earlier if there was heavy rain immediately after the spraying. The spraying was continued from middle of April to August. As the bacteria attack only the tender young tissue it is very important that all the new growths of leaves, stems, branches and fruits as they develop are kept thoroughly covered by the fungicide. Because the spraying is done during the rains it becomes necessary to use some sticker in the fungicide. Use of Albolenum at the rate of 8 ounces per 100 gallons of spray has been found to give very good results and comparative studies have shown that a spray with a sticker added in it is better than one without a sticker.

Spraying operations carried out at the Burnihat Citrus Research Station have given very promising results and the extent of damage caused by this disease to fruits has been brought down from 85 to 5 per cent.

PLANT QUARANTINE IMPORT RESTRICTIONS OF EGYPT*

The summary of Plant Quarantine import restrictions of Egypt has been given below for the information of nurserymen, plant quarantine officials and others interested in the exportation of plants and plant products to that country:—

The Egyptian plant quarantine regulations administered by the Plant Quarantine Section of the Ministry of Agriculture, regulate the entry of plants, parts of plants, fruits (fresh or dried), vegetables, seeds, bulbs, tubers, corms, rhizomes, molds, bacteria, fungi, living stages of insects, wastes of natural silk, peats, soils, timber, wood, cotton samples for trade, cotton beddings and containers used for the transportation of prohibited products.

General entry requirements.—1. General requirements for importations of plants and parts thereof including seeds, fruits, vegetables, bulbs, etc., are as follows :—

(a) A phytosanitary certificate.—Each consignment as indicated below should be accompanied by a certificate issued by an authorized official of the Government of the country of origin. (1) *Fruits, vegetables and seeds* : The certificate must affirm the freedom of the shipment from injurious insects and plant diseases and indicate its actual origin and locality where grown ; (2) *Nursery stock* : The certificate should state that the plants had not been grown in an area infested with an injurious agricultural disease and that they have been duly inspected by a responsible expert and found free from disease. In addition, there should be a list of all kinds of plants the importation of which had been authorized according to the importer's application for permit. Should other kinds of plants be included, the entire shipment may be re-exported or destroyed without any compensation given to the owner. If number of plants imported exceeds the number which was authorized, the consignee should return the excess at his own expense, otherwise the extra plants may have to be destroyed without right of indemnity.

(b) Import permit is required in advance of importation in all cases. A request for import licence should be made to the Plant Quarantine Section at Cairo or to any of its branches at ports of entry before order is placed abroad for any agricultural consignment (fruits, vegetables, seeds, living plants and parts thereof etc.). The application should indicate the kinds and the quantities of the consignments, the country of origin and shipping port.

(c) Authorized ports of entry : Alexandria only for nursery stock. Alexandria, Damietta, Port Said, Kantara, Yamailieh, Suez, Cairo and Shallal for entry of all agricultural consignments (nursery stock excepted). Consignments subject to fumigation arriving at a port not equipped for that work or possessing equipment of insufficient size, should be reshipped by sea at the expense of the consignee to any port possessing sufficient equipment.

NOTE—Plants and parts thereof which are imported under a special permit should be imported through the custom house or parcel office at Alexandria. If these are imported to any other port, they should be re-shipped immediately by air or sea to Alexandria at the expense of the importer.

Extract from the summary given in U.S.D.A. Service and Regulatory Announcements (corrected upto June 27, 1950) April to June 1950-B.E.P.Q. 375, third revision—issued November, 1950.

General regulations under law 61 of June 12, 1946.

Fumigation required.—All consignments found infected with a pest which in the opinion of the Ministry of Agriculture can be effectively killed by fumigation should be thus treated by the Ministry at the expense of the consignee according to the method considered applicable.

Exceptionally, consignments arriving by parcel post of Sudan origin (Law 77 of May 1948) are fumigated at the expense of the Ministry.

Consignments considered by the Ministry of Agriculture incapable of an effective disinfection and those which are infected with injurious pests not recorded in Egypt, are refused entry and should be re-exported within 7 days from the date of the notification to the consignee. If not re-exported at the expiration of the period they will be destroyed without right of indemnity to the owner.

Packing of imported consignments.—The packing of plants, fruits, vegetables and seeds, etc., proceeding from foreign countries and subject to fumigation should be of such a character as to facilitate their inspection and if deemed necessary, their fumigation. In default of this, the package will be opened at the risk of the consignee.

NOTE.—Plants and parts thereof should be free from sand or soil. They may be packed in peat, sphagnum or polypodium (Osmundine). The use of branches, leaves or other parts of plants, either dried or fresh as packing is strictly prohibited. Each kind of plant should be packed separately.

Prohibited shipments returned or destroyed.—Consignments from foreign countries whose importation is prohibited by the preceding provisions shall be re-exported within 10 days from the date of arrival ; if at the expiration of that period re-exportation has not been effected, they shall be destroyed and their owners shall have no claim to indemnity.

Importation for Scientific Purposes Excepted.—Any prohibited material imported for scientific purposes can be exceptionally allowed entry by a Ministerial order from the Minister of Agriculture.

Summary of Regulations

Commodity affected	Degree of prohibition
1. (a) Cotton (<i>Gossypium</i> spp.) plants, parts of plants, ginned or unginned cotton and cotton seed.	Importation prohibited*
(b) Okra (<i>Hibiscus esculentus</i>), Ambari Hemp (<i>Hibiscus cannabinus</i>), all species of <i>Hibiscus</i> family, plants, parts of plants, fruits and seeds (with the exception of flowers and seeds of <i>Hibiscus sabdariffa</i>)	Ditto

*Law No. 61 of June 12, 1946.

Commodity affected	Degree of prohibition
(c) Grape vine plants (<i>Vitis</i> spp.) including cuttings, roots and leaves, whether imported as merchandise or used as packing material.	Importation prohibited ¹
(d) Mango (<i>Mangifera indica</i>), fruits and seeds.	Ditto.
(e) Sugarcane, plants cuttings or seeds.	Ditto.
(f) Earth, soil	Ditto.
(g) Living insects in all stages.	Ditto.
(h) Cultures of bacteria and fungi injurious to plants.	Ditto.
(i) Used containers (bags, boxes, cases, etc.) previously used in the packing and transportation of prohibited articles.	Ditto.
(j) Plants and parts thereof (including fruits, vegetables, onions and potatoes, etc.) if declared infested at port of entry with the insects or diseases listed in table 2 & 3.	Ditto.
(k) Birdlime in all forms	Ditto. ²
(l) Tobacco seeds (<i>Nicotiana glauca</i>)	Ditto. ³
2. (a) All kinds of plants and trees and parts thereof including fruit, seeds whether fresh or dried except those above listed 1(a) to (l) inclusive.	Importation restricted ¹ . If the importation is not in accordance with an authorization granted by the Ministry of Agriculture and in conformity with the provisions of authorization. ¹
(b) Silk worm : egg, cocoon and natural silk waste.	Importation restricted. ¹ Special conditions for entry are (a) Authorization in advance. The application should indicate 1. Name and address of applicant. 2. Name and address of exporter and destination of the consignment.

¹ Law No. 16 of June 12, 1946.² Law No. 13 of April, 14, 1922.³ Law No. 73 of July 3 1933.

Commodity affected

Degree of prohibition

(b) Silk worm: egg, cocoon and natural silk waste—*contd.*

3. Quantity and race of eggs. 4. Whether importation is for trade or personal use. If for trade the applicant should keep a record of the names and addresses of his clients and quantities sold for them. All these will be under Control of the Ministry. (b) Consignments should be addressed in care of the Plant Quarantine Section at Alexandria Customs. (c) A phytopathological certificate should accompany each consignment, declaring its freedom from hereditary diseases and the percentage of sterile eggs and foreign matter not to exceed 5 per cent of the net weight. In addition it should be indicated in the certificate. 1. The name and address of the sender. 2. The name and address of the importer. 3. Total net weight of eggs. (d) Each box in the consignment should be checked by an expert, labelled and sealed declaring the race of the eggs, the colour of the cocoons and their origin as well as the net weight. (e) Examination of consignments at port of arrival shall be carried out by an expert official; who is allowed to take samples not to exceed two grams from each lot for the examination of power and percentage of hatching. (f) Refusal of any consignment or a part of a consignment may be due to: (1) Opposition to the above conditions. (2) Hereditary diseases, and (3) hatching of the eggs before delivery. (g) Refused consignments should be re-exported within 7 days notice. If the importer fails to re-export the consignment or if hatching takes place during the 7 days' period, or if the consignment is not cleared from the customs before the end of March the said consignments shall be destroyed at the owner's expense without any compensation.

(c) Honey bees (*Apis mellifera*).

Importation restricted* ; special conditions for entry are: (a) Authorization of the Ministry in advance, (b) each consignment should be accompanied by an official certificate declaring the freedom of the bees and apiary from which the bees are taken, from diseases (c) certificates should be approved by the Egyptian Diplomatic authorities in the country of origin.

(d) Cotton samples for commercial purposes.

Importation restricted ; and special conditions for entry are: (a) should be well-ginned cotton entirely free from cotton seed or any foreign matter, (b) no sample should exceed two Kilos and postal samples without value not to exceed 350 grams each, (c) cotton samples from Sudan should be well packed with cloth inside and with strong

Commodity affected	Degree of prohibition
(d) Cotton samples for commercial purposes— <i>contd.</i>	paper outside. (d) should be addressed to the consignee, c/o the Plant Quarantine Office, Ministry of Agriculture at the port of entry. (e) In case of samples addressed to the consignee only, the Post Office shall notify the owner either to authorise delivery to the Plant Quarantine office or to have them re-exported. If the cotton within the sample is found clearly divided every part should be regarded as a separate sample. In case the consignee objects to such action, the sample will be thoroughly mixed up by the representative of Plant Quarantine, a quality of two kilos taken out and delivered to the consignee after fumigation. (f) when a sample is received by any Plant Quarantine Office, the consignee will be notified. Samples not claimed within 7 days will be destroyed without compensation.
(e) Cotton wool (Manufactured) and Kapok.	NOTE.—The entry of samples of unginned cotton and cotton seed is prohibited, however small the samples may be. Admitted without fumigation.*
(f) Cotton bedding including mattresses, bed covers, cushions, furniture containing unmanufactured cotton.	Importation restricted* ; special conditions for entry are (a) the cotton should be well ginned and entirely free from cotton seed, (b) disinfection is carried out at the port of entry with steam sterilizers of the quarantine authority at 120°C for at least two hours. If the disinfection in the steam sterilizers is proved impossible it can be carried out with vacuum fumigation at the Plant Quarantine Office. In both cases it is done at owner's expense and risk, (c) if accompanied by an official certificate affirming disinfection at the port of export in a steam sterilizer under pressure not more than one month previous to arrival at the port of entry, they will be exempted from treatment.
(g) Cotton and Cotton seed.	Importation restricted* ; I. Permits for transit by air may be issued for the transit of cotton and cotton seed by air mail under the following restrictions : (a) containers to be any metal boxes, soldered, and on no account to be opened in Egyptian territory, (b) transfer should take place only by aeroplanes in the same aerodrome, (c) transit is limited to aeroplanes alone, (d) consignments must not remain in Egyptian territory more than 10 days. They must be under the control of both the Ministry and the Customs while in Egypt. The Customs shall record the date of arrival, number of parcels.

*Law No. 61 of June 12, 1946.

Commodity affected

Degree of prohibition

(g) Cotton and Cotton seed—contd.

date of reexportation (exit) and the number of consignments transferred to another aeroplane. A copy of this information will be forwarded to the Plant Quarantine Officials at the same Customs office, (e) violation of any of these restrictions involves the immediate destruction of the respective consignments. II. Transit from one boat to another in Egyptian ports is subject to the following conditions:

Cotton—(a) An application should be submitted to the Plant Quarantine Office at the port where transshipment is intended to take place giving the following particulars: 1. Name of boat in which the consignment will arrive. 2. Approximate date of arrival. 3. Number of cotton bales and total weight. *(b)* As soon as the boat arrives, the Plant Quarantine Officer should be notified so that his representative may take steps to undertake his duty. *(c)* Transshipment may either take place direct from one boat to another or by means of lighters. The bales in the lighter should be well covered by canvas to the satisfaction of the delegate of the Plant Quarantine Section.

Cottonseed (a) Transshipment of cottonseed is allowed only at Port Said or Suez ports *(b)* an application should be submitted to the Plant Quarantine Office at the port where transshipment is intended to take place giving the following particulars: 1. Name of boat in which the consignment will arrive 2. Approximate date of arrival. 3. Number of cotton seed bags and total weight. *(c)* As soon as the boat arrives the Plant Quarantine Officer should be notified to undertake his duty. Time of off loading must be previously fixed. *(d)* Cotton seed should be contained in well-closed sacks. *(e)* Cotton seed is strictly forbidden to be landed on harbour quays. *(f)* Transshipment may either take place direct from one boat to another or by means of lighters. In this latter case, the lighters after the completion of transshipment should be cleaned under the supervision of the Plant Quarantine Delegate and according to his directions. *(g)* Sweeping should either be collected and burnt or thrown in the sea. *(h)* Transshipment of cotton seed by rail is forbidden. *(i)* Cotton grown in Egypt is exempted of these restrictions. III. Cottonseed from Sudan: Importation of cottonseed from Sudan for oil extraction is exempted from prohibited importation.

Commodity affected	Degree of prohibition
(e) Plants and parts of plants (including fruits, vegetables, onions and potatoes, etc.)	Importation restricted ¹ ; if declared infested at the port of entry with the insects listed in Table 1 below, they have to be fumigated.
(f) Hemp seeds (<i>Cannabis sativa</i>).	Importation restricted ² ; they must be rendered unviable before importation. Special conditions for entry (a) authorization in advance; (b) certificate from country of origin declaring that the seeds had been sufficiently roasted to destroy their germinability.
(g) Peat	Importation restricted 1. Must be free from sand and soil; 2. Bags, Boxes and all other containers used in packing must be new. 3. Official certificate of freedom of country of origin from Foot and Mouth Disease and Anthrax must accompany consignment.

¹ Law No. 61 of June 12, 1946.

² Decree law No. 95 of June, 18, 1931.

TABLE NO. I

As the following pests can be destroyed by fumigation, shipments of plants and parts of plants, including fruits, vegetables, onions, potatoes, etc., found infested or infected by them at port of arrival must be fumigated as prescribed by the Minister of Agriculture at the expense of the importer, except parcel post packages which are treated at the expense of the Ministry of Agriculture (Law No. 61 of 1946, August 6).

<i>Alphitobius</i> spp.	<i>Aspidiotus cydoniae</i> Comst.	<i>Batodes</i> (<i>Capua</i>) <i>angustierana</i> (Haw.)
<i>Anobiidae</i> , except wood-borers	<i>Aspidiotus hederæ</i> (Vall.)	<i>Bostrichidae</i> —Egyptian genera only.
<i>Aonidiella</i> , <i>aurantii</i> (Mask)	<i>Aspidiotus ostreaeformis</i> Curt.	<i>Bruchidae</i>
<i>Aonidiella</i> <i>lauhae</i>	<i>Asterolecanium pustulans</i> (Ckll.)	<i>Buprestidae</i> —Egyptian genera only.
<i>Aspidiotus britannicus</i> (Newst)		<i>Ohionaspis striata</i> Newst.
<i>Aspidiotus cyanophylli</i> (Sign.)		<i>Chrysomelidae</i>
<i>Balaninus</i> spp.		

<i>Cacoecia</i> spp.	<i>Lecanium</i> spp.
<i>Calandra</i> spp.	<i>Lepidosaphes beckii</i> (Newn.)
<i>Camponotus</i> spp.	<i>Lepidosaphes ulmi</i> (L.)
<i>Celerio</i> (<i>Deilephila livornica</i> (Esp.)	<i>Lepismidæ</i>
<i>Cerambycidae</i> —Egyptian genera only.	<i>Lyctidæ</i> —Egyptian genera only.
<i>Ceroplastes</i> spp.	<i>Macalla syrichtusalis</i> (Wlkr.)
<i>Chionaspis euonymi</i> Comst.	<i>Murmidius ovalis</i> Bäck.
<i>Chrysomphalus dictyospermi</i> (Morg.)	<i>Mycetophagidæ</i>
<i>Chrysomphalus ficus</i> Ashm.	<i>Myelois ceratonix</i> Zell.
<i>Cleridæ</i>	<i>Nitidulidæ</i>
<i>Cnephasia</i> spp.	<i>Oryzophilus surinamensis</i> (L.)
<i>Corecra cephalonica</i> Saint.	<i>Parlatoria blanchardi</i> (Targ.)
<i>Cryptolabea gnidiella</i> (Mill.)	<i>Parlatoria oleæ</i> (Colve.)
<i>Cryptophagidæ</i>	<i>Parlatoria pargandii</i> Comst.
<i>Dermestidæ</i>	<i>Parlatoria proteus</i> (Curtis)
<i>Drosophila melanogaster</i> Mg.	<i>Phenacoccus hirsutus</i> Green
<i>Ephestia</i> spp.	<i>Plodia</i> spp.
<i>Empoasca</i> spp.	<i>Pseudococcus citri</i> (Risso)
<i>Epidiaspis (pyri) pyricola</i> (Dè! Guer.)	<i>Pseudococcus filamentosus</i> (Ckll.)
<i>Eriophyes</i> spp.	<i>Pseudococcus (longispinus) adonidum</i> Linn.
<i>Eri^{osa} lanigerum</i> (Hausm.)	<i>Pyralis</i> spp.
<i>Eumerus amoenus</i> Loew.	<i>Pyrausta nubilalis</i> Hbn.
<i>Euthalia garuda</i> (Moore.)	<i>Saissetia hemisphærica</i> (Targ.)
<i>Galleria mellonella</i> L.	<i>Saissetia oleæ</i> (Bern.)
<i>Geometridæ</i>	<i>Sitona</i> spp.
<i>Glyphodes unionalis</i> (Hbn.)	<i>Sitotroga cerealella</i> (Oliv.)
<i>Gnorimoschema operculella</i> (Zell.)	<i>Tenebrio</i> spp.
<i>Histeridæ</i>	<i>Tenebroides mauritanicus</i> (L.)
<i>Icerya purchasi</i> Mask.	<i>Thrips tabaci</i> Lind.
<i>Lab dura raparia</i> (Pallas.)	<i>Tineidæ</i> —genera attacking wool.
<i>Laemophloeus</i> spp.	<i>Tribolium</i> spp.
<i>Lasioderma</i> spp.	<i>Trionymus lounsburyi</i> (Brain)
<i>Latheticus oryzae</i> Water.	<i>Tyroglyphus</i> spp.
<i>Lathridiidæ</i>	<i>Virachola livia</i> Klug.

TABLE No. II

The following pests have been declared injurious to plants and incurable and therefore any plant or agricultural product found infested or infected by them at port of arrival, shall be prohibited entry, and shall be re-exported

within 10 days or destroyed at the expenses of the importer, (Law No. 61 of 1946, Arts. 3 and 6).

Insects	Insects	Insects
<i>Aulacaspis pentagona</i> (Targ)	<i>Lonchaea aurea</i> Macq.	<i>Pseudococcus virgatus</i> (Ckll.).
<i>Aulacaspis rosae</i> Bouche	<i>Myiopardalis pardalina</i> (Big.)	<i>Pulvinaria psidii</i> Mask.
<i>Aulacaspis cinnamomi</i> var <i>mangiferae</i> Newst.	<i>Orthesia insignis</i> Browne	Plant Diseases
<i>Ceratitis capitata</i> (Wied.)	<i>Parlatoria zizyphus</i> (Lucas)	<i>Bacterium tumefaciens</i> (E.F. Sm.)
<i>Chrysomphalus personatus</i> (Comst)	<i>Polychrosis botrana</i> Schiff.	<i>Sphacelotheca sorghi</i> (Lk.) Clinton
<i>Dacus oleae</i> (Gmel.)		Eelworms
<i>Lecanium acuminatum</i> Sign.	<i>Pseudococcus maritimus</i> (Ehrh.)	<i>Heterodera</i> spp.

TABLE No. III

The following pests are non-existent in Egypt and therefore any shipment of plants or plant products found infested or infected by them at port of arrival shall be prohibited entry and either re-exported or destroyed (Law No. 61 of 1948) :—

Insects		
<i>Anarsia lineatella</i> Zell.	<i>Cosmopolites sordidus</i> Germ.	<i>Laspeyresia</i> spp.
Anobiidae-wood-borers only	<i>Cryptorhynchus mangiferae</i> Fab.	<i>Leptinotarsa decemlineata</i> (Say)
<i>Anthonomus</i> spp.	<i>Cynipae</i>	<i>Lonchaea aristella</i> Beck.
<i>Araecerus fasciculatus</i> (Deg.)	<i>Epitrix cucumeris</i> (Harris)	<i>Oryctes elegans</i> , Prall.
<i>Argyroplote leucotreta</i> Meyr.	<i>Eulecanium capreae</i> Linn.	<i>Phylloxera vastatrix vitifoliae</i> Fitch
<i>Aspidiotus destructor</i> Sign.	<i>Eumerus strigatus</i> (Fall.)	<i>Popillia japonica</i> Newm.
<i>Aspidiotus perniciosus</i> Comst.	<i>Eurytomidae</i> -if plant pests.	<i>Pseudococcus comstocki</i> (Kuw.)
<i>Aspidiotus rapax</i> Comst.	<i>Grapholita funebrana</i> Treit.	<i>Pseudococcus nipae</i> (Mask.)
<i>Aulonium</i> spp.	<i>Icerya seychellarum</i> Westw.	<i>Pseudophilus testaceus</i> Gahan
<i>Carpocapsa pomonella</i> (L.)	<i>Ips erosus</i>	<i>Rhyncites</i> spp.
<i>Clysia ambiguella</i> Hbn.	<i>Iridomyrmex humilis</i> Mayr.	<i>Stephanoderes hampei</i> (Ferr.)
	<i>Lampetia</i> (Merodon) <i>equestris</i> (F.)	<i>Tephritidae</i> (Trypetidae)
		<i>Trioza buxtoni</i> Laing
Mites	Plant Diseases	Plant Diseases
<i>Eriophyes sheldoni</i> Ewing	<i>Glomerella cingulata</i> (Ston.) Spauld. & Schrenk.	<i>Synchytrium endobioticum</i> . (Schilb.) Pero.
<i>Paratetranychus pilosus</i> (C.&F.)	<i>Gymnosporangium juniperi virginianae</i> Schw.	<i>Uncinula necator</i> (Schw.) Burn
<i>Paratetranychus simplex</i> (Banks)		<i>Urocystis cepulae</i> Frost.
Plant diseases	<i>Phyllosticta solitaria</i> Ell & Ev.	<i>Venturia inequalis</i> (Cke.) Wint.
<i>Actinomyces scabies</i> (Thax.) Guss.	<i>Phytophthora citri</i> (Hasse) Doidge.	<i>Venturia pyrina</i> Aderh.
<i>Bacillus amylovorus</i> (E.F.Sm.)		Virus diseases of potato.
<i>Colletotrichum lagenarium</i> (Pass) Ell. & Hals.	<i>Phytophthora syringae</i> v. Hall	Eelworms
	<i>Sclerotium cepivorum</i> Berk.	<i>Tylenchus</i> spp.

NOTES AND NEWS

Leaf Scald Disease of Sugar cane in British Guiana*

Leaf scald disease, a bacteriological disease of extreme virulence which causes the sugarcane to wither and reduces its yield of sugar by fifty per cent. or more, has recently been discovered on the sugar estates in British Guiana. It had previously been reported from sugar-growing areas in Mauritius, Queensland and Hawaii, where it was eventually brought under control by breeding resistant strains and enforcing plant-hygiene measures; but this is the first recorded case in the West Indian region.

Control of Grasshoppers in Bombay in 1950-51

Unlike the last year 1949-50, the infestation of the Deccan wingless grass hopper, *Colemania sphenarioides* was low in the year under report. The jowar and bajra crops were treated over an area of 15,361 acres and additional yield of 39,447 maunds of grain was obtained.

Mites on Cotton†

Spider mites on cotton—the Atlantic mite, *Tetranychus atlanticus* McG. the Pacific mite, *T. pacificus* McG. : the two-spotted mite, *T. bimaculatus* Harvey should be controlled by killing the mites in their overwintering stages on winter and spring host plants and on the ground. Weed killing chemicals such as oils—and sprays containing oils, dinitro compounds and some others—will kill the mites they contact on the ground as well as on the weed hosts. Many of the sprays used on dormant fruit trees are effective in killing mites throughout the orchard. The hormone types of weed killing chemicals such as 2,4-D will probably not kill any mites but will result only in destroying the host plants.

The districts in which spider mites have been pests of cotton and other crops should be thoroughly cleaned of weeds and well cultivated before cotton is planted. Fence rows, ditches, orchards vineyards and weedy areas of unfarmed land nearby are some of the most important sources of these infestations in crops. The two-spotted spider mite has been the most difficult to control on California cotton. None of the dusts or sprays has given more than an occasional satisfactory control when applied by aircraft. Sulfur has given good control of the Atlantic mite but not of the others and nothing has been found to replace the sulfur or to be a near substitute for it. In 1949, the serious infestations of the Pacific mite were controlled with dusts containing 1 per cent parathion. It was found that if the maximum temperature reached 95°F. or above, the residual effect of parathion was not sufficient to control mites hatching three to four days after it was applied. Therefore, two applications with an interval of four days are required when temperatures are high. This treatment of two applications of one per cent parathion dust was found to control the two-spotted mite if thorough coverage was obtained with row-crops equipment. Thus dusts containing 3 per cent and 4 per cent Aramite-88R—were effective in but one application per treatment. But both of these gave mostly poor control of two-spotted mites when applied by aircraft. In cotton dust formulations, physical properties close to those of a good grade of dusting sulfur are most desirable. Findings show that if the diluents used produce a dust of greater or less density and dustability than dusting sulfur—95 per cent of which will pass through a 325 mesh screen—good under leaf coverage will not be obtained with the usual applicants by aircraft.

*Extract from "Nature" Vol. 167, No. 4250, April 14, 1951, p. 588.

†Abstract from an article by Gordon L. Smith & Douglas E. Bryan in California Agriculture, 5. (4), 11-15, 1951.

Interception of the Australian Carpet Beetle—*Anthrenocerus australis* (Hope) at Quarantine in India

This Dermestid beetle of Australian origin, a pest of stored products, hides, woollen materials and textiles is gradually spreading to other parts of the world. It was introduced into Britain in 1933, and has since been repeatedly found as a pest in textile mills. Recently it has also been recorded in Netherlands. This injurious species has, however, not been found in India so far. In 1949, a consignment containing a sample of wool from Australia addressed to a firm in the Punjab (I) was received for examination from the Collector of Customs, Bombay, by Dr. V. P. Rao of the Directorate of Plant Protection, Quarantine and Storage, Government of India, New Delhi when he was the Quarantine Entomologist at that port. An examination of the sample of wool revealed specimens of this beetle. The danger of entry of noxious pests into the country through very unexpected ways, therefore, can be easily imagined, and the need for careful quarantine inspection of all imported material through which foreign pests can find a way into this country hardly requires any emphasis.

The safe handling of Phosphorus Insecticides with special reference to Parathion*

In the past few years a new range of insecticides and acaricides based on organic phosphorus compounds has been in use by farmers. They are of extreme potency at very low dosages and are of exceptional safety so far as the crop is concerned. But they are very poisonous to human beings and must be handled with great care. Parathion, HETP, TEPP and the so-called systemic insecticides belong to this group.

Parathion is an oily liquid with quite a low vapour pressure. It is toxic if it enters the body by mouth or by skin or any external surface of the body including hair or eyes, and it is readily absorbed through the skin.

Dust as well as the liquid forms of this insecticide demand equal amount of caution when using although liquid form is considered to be safer.

The symptoms of parathion poisoning are : (a) headache, nausea, diarrhoea and tightness of the chest (b) slight twitching of the muscles of the eyelids and tongue and (c) contracting pupils.

The first aid treatment in parathion-poisoning is :—

Remove the patient from further exposure and immediately administer two half milligram tablets of atropine sulphate by the mouth with a repeat dose of atropine sulphate after one hour if the symptoms are not relieved and the pupils are not back to normal. Call for a doctor with atropine injection ampoules :—

General instructions to the Farmer

1. Use a liquid preparation in preference to a dispersible powder or dust.
2. Read the directions and warnings on the label and follow them scrupulously.
3. Store the product under lock and key away from foodstuffs.

*Abstract from an article by W. R. Orrell in Plant Protection Overseas Review, I (4), 9-13, 1950.

4. No one handling parathion or applying it must be allowed to smoke whilst on duty.
5. Neither food nor drink should be taken by anyone either during handling parathion or until they have had a general clean up and change of clothing.
6. Move animals and poultry away during spraying and do not let them return for at least four weeks in the case of parathion or 24 hours in the case of HETP or TEPP.
7. Do not apply parathion within 4 weeks of harvesting crops which will be eaten by human beings, animals or poultry.
8. It is advisable in cases where workers are exposed to spray drift for long periods to take them off the work at frequent intervals.

Instructions to the man mixing the product

1. Change into an old suit kept on the farm and wear rubber boots. (Natural rubber), rubber gloves with gauntlets, a rubber apron with bib, and goggles to protect the eyes. Wear an approved gasmask when a dispersible powder is used.
2. Be careful not to splash when opening the container.
3. Have handy at least one 3 gallon bucket with soap and water or a suitable spreader and water (e.g., a teaspoonful of Agral L. N. to a bucket of water) and use this water for washing any spilt of the insecticide on body, but in case the insecticide falls into eye use only clear water and call a doctor.
4. Contaminated clothing should be immediately removed and skin should be washed with clean soap or wetting agent and water.
5. After the spraying work :
 - (a) Wash your machine out with water containing a pound of washing soda per 10 gallons.
 - (b) Wash out the empty containers twice with the water containing soda. Puncture holes in them or flatten them and bury them.
 - (c) Lock up unused product in its store, ensuring first that any containers that have been opened have their caps securely replaced.
 - (d) Wash all contaminated equipment, with your gloves on in clean water and soap or spreader; and dry them and dust your personal equipment like rubber gloves etc., well with talcum powder.
 - (e) Change to your ordinary clothes—after washing your person well.

Instructions to spray gangs

1. Keep a suit of old clothes, dungrees or overalls on the farm specially for sprayings.
2. Always wear rubber gloves, rubber boots and rubber aprons when spraying, and when spraying tall crops such as apples and hops wear also oilskins and sou'westers.
3. Continuous contact with drift from spray applied at 100 gallons per acre is dangerous, unless complete protective clothing and a visor type of helmet are used.

4. Do not spray in very windy weather.
5. Never clear blocked jets by blowing them out with the mouth.
6. Animals used for pulling sprayers should be changed at intervals.
7. Spray should be kept out of ponds and streams.
8. After completion of spraying all clothing worn should be completely washed, dried and powdered before using again the next day.
9. Have a good wash and pay particular attention to your hands especially if you roll your own cigarettes.
10. Change into your ordinary clothes.
11. Overalls should be washed at least once a week.

Crag Herbicide ¹

A new agricultural chemical for use in the pre-emergence weeding of large seeded crops is now available in the U. S. A. This chemical, known as Experimental Herbicide I, gives excellent weed control. Because of its outstanding success on strawberries, it is now being produced on a commercial scale under the name Crag Herbicide I for use on strawberries. Chemically it is Sodium 2, 4 dichlorophenyl "Cellosolve" sulphate. This herbicide is freely soluble in water. It is of low toxicity to warm blooded animals. Its physiological effects on plants are markedly different from 2, 4-D in any of its forms. Water solution or dust application of this herbicide to the foliage of plants induce little or no epinestic or formative effects. Consequently, spray or dust applications involve little or no hazard to sensitive crops in surrounding areas. Excellent results have been obtained for pre-emergence weeding using water solutions at the rate of $1\frac{1}{2}$ to 3 lb. of herbicide per acre.

A New, Safe Fruit-Fumigant²

The Hawaiian Agricultural Experiment Station Scientists have found that ethylene dibromide can be safely used as a fumigant on perishable foods to kill the oriental fruit fly, the melon fly, and the Mediterranean fruit fly, and that fruits as well as vegetables are more tolerant to ethylene dibromide fumigation than any other fumigant tested.

Avacados, bell peppers, melons, bananas, cucumbers, papayas, pineapples, string beans, and squashes may be fumigated with ethylene dibromide at a rate of one pound per 2,000 cubic feet of space over a two-hour period at 70°F.

Taint in Potatoes grown on land treated with Crude Benzene Hexachlorides against wire-worms³

It has been shown that potatoes grown on land treated with $2\frac{1}{2}$ lb. crude BHC per acre, for the control of wire-worm, may be slightly tainted, the risk becoming very small after 30 months.

With mounting BHC dosage, increasingly larger periods will be needed before potatoes can be grown without risk of any taint. For example, 4 lb.

¹The Chemical Digest News and Uses of Synthetic Organic Chemicals. Issue No. 1. 1951.

²Extracted from American Agriculture, 51.A-12, June 6, 1951, p. 9.

³Extract from an article by Jamesod, H. R. and Sanner, C. C. in Journal of Science for Food and Agriculture, 2, (4), 171-175, 1951.

crude BHC per acre (a rate in the range commonly used as a soil treatment) is likely to cause definite taint in potatoes grown within 18 months after soil treatment occasional taint of decreasing intensity if grown in the next 18 months; and no taint if grown still later, i.e., 3 years after soil treatment.

It was also observed that the taint susceptibilities of four typical varieties increased in the order ; King Edward, Arson Banner, Majestic and Eclipse. Soil and climate may have produced slight differential effects as well.

The results of these experiments do not hold when BHC is applied by surface dusting, and therefore not worked into the soil. For example, during the past 6 years the chemical has been widely used at the rates up to 6 lb. per acre in the control of flea beetle on *Brassicae* without complaints having been made of taint in the following potato crops.

These findings should be of practical value, for in recent years much publicity has been given to crop tainting by BHC and it is important that the extent of the hazards should be defined—so that this valuable insecticide may be used with confidence.

Development in Agricultural Fungicides*

Rapid developments are taking place in the field of fungicides. The inorganic compounds of sulphur, copper or mercury are giving place to organic derivatives which are more specific in effect, can be used at lower dilutions, and are usually less phytotoxic. These include compounds like the tetra methyl thiuram disulphide, the dithiocarbamates, and the organic mercury compounds, namely, the phenyl mercuric chloride, phenyl mercury acetate and phenyl mercury monoethanol ammonium lactate. Of the organic copper fungicides, mention may be made of the copper 8 quinolinolate. There are also compounds, which contain neither the copper, sulphur or mercury, the quinones, the axoles, the halogenate hydrocarbons and the fungicidal antibiotics like the gliotoxines, antimycin and actidione.

There has also been a relatively new development in their modes of application. Some of them are injected in the soil to check the growth of root-attacking fungi, e.g., in California chloropierin and 1:3 dichloropropene have been used as soil fumigants on a limited scale. As sprays, some of them are diluted with air, steam or carbon dioxide, instead of the large quantities of water. This has been particularly true for insecticides. The applications in the field are made, either from air or from mobile ground equipment and the concentrate is atomized into the air stream, which carries the finely divided insecticidal deposit on to the foliage.

It has also been shown, during recent years, that certain fungicides when applied to plant surfaces get translocated and exert a fungistatic effect within the plant tissues ; e.g., in case of Dutch elm disease, a solution of 8-quinolinol benzoate injected 18-24" below the soil surface, in the feeding root zone of infected trees, temporarily suppresses the symptoms. Pyrazole compounds, when sprayed on tomato leaves were translocated to other parts of the plant and reduced susceptibility to leaf spot caused by *Alternaria solani*.

However, the use of systemic fungicides has not yet reached the stage where it could provide a practical means of plant disease control.

*Abstract from "Developments in Agricultural Fungicide" by R. W. Marsh, *Nature*, 167 (4238), 97-98, 1951.

Chemicals used to increase U. S. Crop Production*

Many more American farmers are now using chemicals to increase their crop production. More than 10,000,000 lb. of organic fungicides were used during 1950 on U. S. farms. The new chemicals are most effective in controlling weeds, fungus diseases and soil pests.

Chemicals to control weeds include ammonium sulfamate, cyanamide, chlorates, arsenicals and herbicidal oils. One of the most significant current developments is centered around the use of chemicals to kill weed seedlings during the process of germination. Promising results are reported in treating sugar beets, cotton, groundnuts, soybeans, potatoes, asparagus and gladiolus. The use of chemicals for weed control was very restricted till as recently as 1945. Last year, however, farmers applied herbicides to more than 30,000,000 acres of crop land in the U.S.A.

Fungus diseases of plants have been successfully treated with such chemical compounds as dithiocarbamates, phenyl mercury compounds and phthalimide derivatives. Organic compounds have solved most of the problems of fruit and vegetable damage from copper fungicides. The use of dithiocarbamate compounds has increased Anjou pear production in the United States by 300,000 boxes annually.

The recent discovery of soil fumigants such as dichloropropene and ethylene dibromide is now making it possible to control crop-destructive round worms, such as nematodes and wire-worms. As soil treatments are expensive their use is at present limited to tobacco, sugar beets and vegetables.

New uses of chemicals for preserving and improving crops have also been found in the U.S.A. About 20,000 acres of apple orchards in the Pacific North West were thinned with spray applications of dinitro compound at blossom time last year. Experiments have shown that thinning apple trees with chemicals gives a 15 per cent increase in yield for only a fraction of the cost of thinning them by hand.

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